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New Project Kick-Off Meeting

## Plate-based fuel processing system

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# Project Information

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**Plate Based Fuel Processing System**  
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# Project Information

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**Project duration:**    **Start**                      **October 1, 2001**  
                                 **Completion**        **September 30, 2005**

**Total estimated funding: \$11,657,730**

**Subcontractor:**

- **National Fuel Cell Research Center (NFCRC)**
  - **Studies to identify performance targets and functional specifications**

# Technical Goals

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- **Technical Goals:**

- **Reactor systems for 50 kW(e) fuel processor**
  - Innovative reactor designs
  - Close integration between components
  - Catalyst development
- **Develop Simulation models for all reactor components**
  - Rapid design optimization
  - Define catalyst performance requirements
- **Wide load range with fast transient capability**
  - Reactor system design capable of fast transients
- **Capability of handling EPA Tier 2 gasoline (30 ppm average, 80 ppm maximum sulfur)**
- **Other DoE Technical Targets**

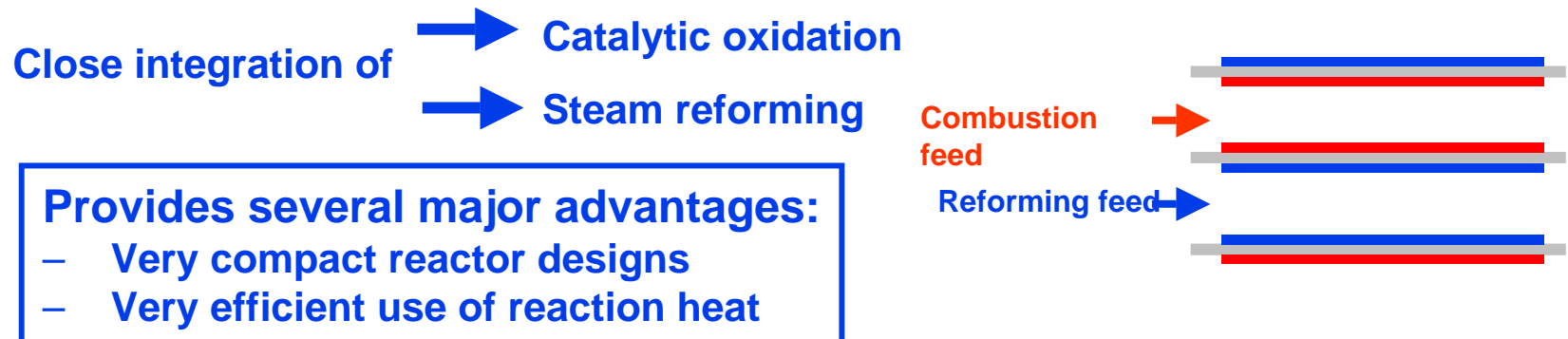
- Reformer < 10 L
- WGS reactor < 20 L
- PrOx reactor < 10 L

# Overview of Technical Concept

## Plate based fuel processor system

- Innovative reactor systems that optimize performance

### Example: Plate based steam reformer reactor



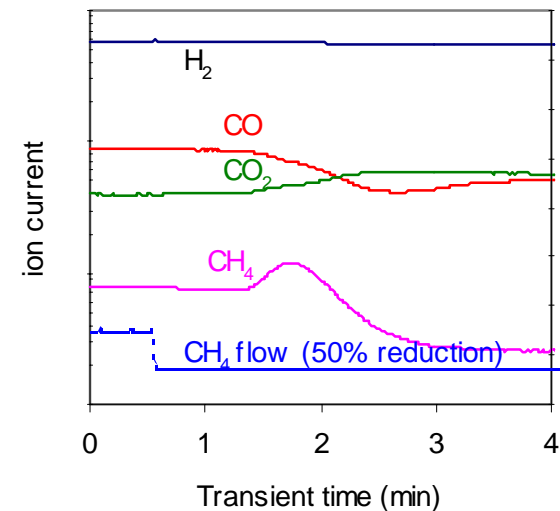
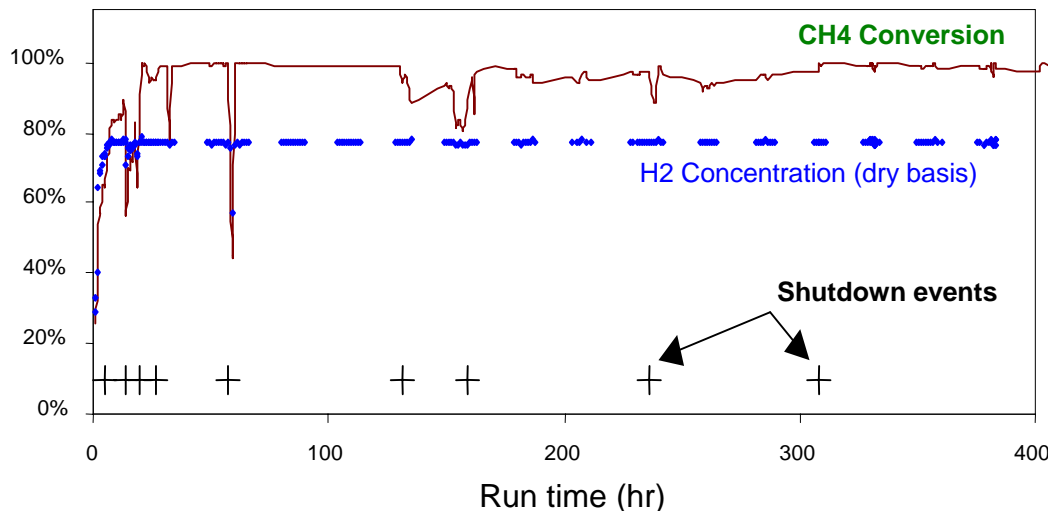
## Draws on Catalytica's base in catalytic combustion and fuel processing

- Commercial products operating in the field
- Durability experience
- Manufacturing experience

# Technology-continued

Work to date has demonstrated a 1 kW prototype reformer for methane

- At 50 kW(e) would achieve 6 kW/L and 2 kW/kg
- Demonstrated stable performance for 400 hours
- Preliminary demonstration of load transient capability



# Work Plan Summary

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## Phase 1- Conceptual design

### 1. Reformer

- Catalyst development--sulfur tolerant steam reforming catalyst
- Reactor design, reactor model, and durability prediction

### 2. Water gas shift

- Catalyst development--fast start up, non-air sensitive, high activity
- Reactor design, reactor model, durability prediction

### 3. PrOx reactor

- Reactor design

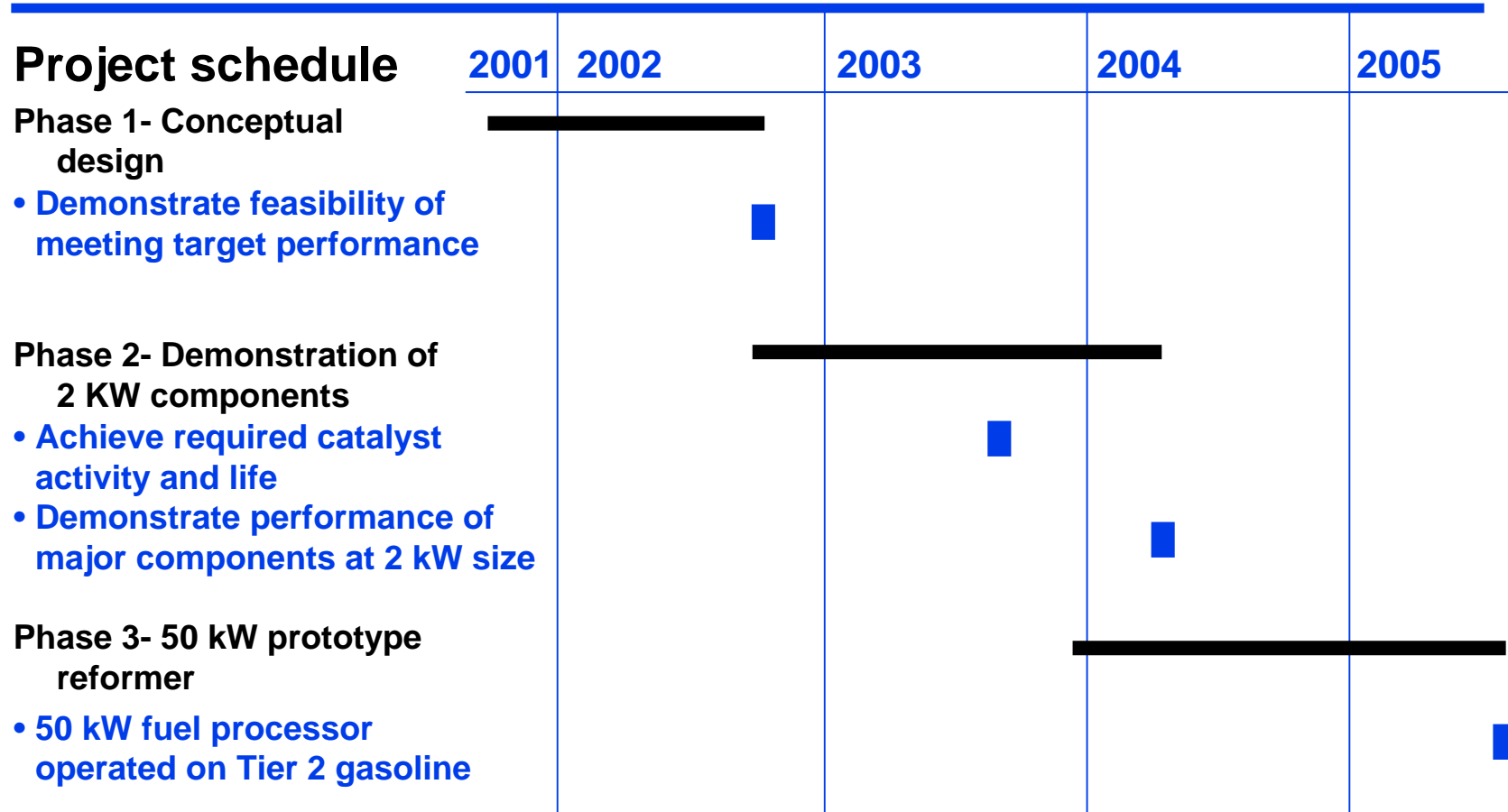
## Phase 2- Develop and demonstrate 2 KW components

1. Design and fab 2 kW components
2. Demonstrate required performance of each subsystem
3. Demonstrate durability--agreement with predictive model
4. Initial design of 50 kW system with control strategy

## Phase 3- 50 kW prototype reformer

1. Design 50 kW components
2. Design integrated processor
3. Develop control system

# Schedule and Milestones



## Year 1--Definition of technical success

- Reactor process simulations showing target reactor size
- Catalyst performance meeting required activity and durability

# Potential For Technical Collaboration

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## Areas of interest

- **Integration of fuel processor with fuel cells**
  - **Fuel cell simulation model--**
    - Fuel processor system optimization
    - Fuel processor + fuel cell system integration studies
  - **Partners interested in integration and performance studies with reactor components**
  - **Partner for integration and performance studies with full 50 kW fuel processor (later years)**
- **Fuel processor system integration**
  - **Processor system design and integration**
  - **Fuel processor control system**